PCT WORLD INTELLECTUAL PROPERTY ORGANIZATION
International Bureau

INTERNATIONAL APPLICATION PUBLISHED UNDER THE PATENT COOPERATION TREATY (PCT)

(51) International Patent Classification 6 : H04J — A2

(11) International Publication Number: **WO 97/44922**

(43) International Publication Date: 27 November 1997 (27.11.97)

(21) International Application Number: PCT/EP97/02487

(22) International Filing Date: 15 May 1997 (15.05.97)

(30) Priority Data:
9610398.1 17 May 1996 (17.05.96) GB

(71) Applicant *(for all designated States except US)*: MOTOROLA LIMITED [GB/GB]; Jays Close, Viables Industrial Estate, Basingstoke, Hampshire RG22 4PD (GB).

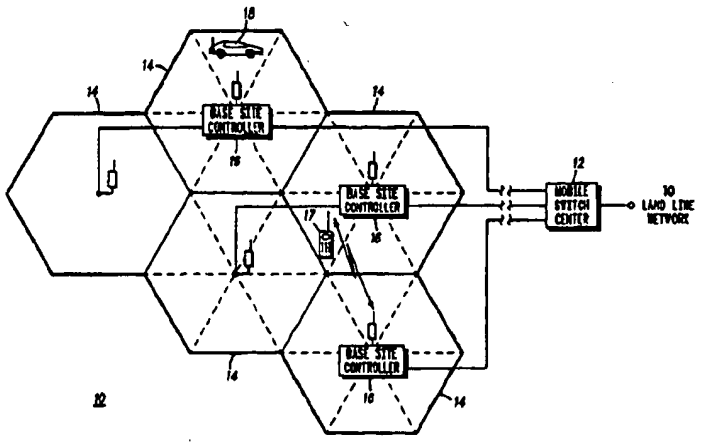
(72) Inventors; and
(75) Inventors/Applicants *(for US only)*: WHINNETT, Nicholas, William [GB/FR]; 7, rue de la Cerisale, F-75004 Paris (FR). ROBINSON, William, Neil [GB/FR]; 6, allée du Plantier du Roi, F-78860 Saint Nom la Breteche (FR). GIBBS, Jonathan, Alastair [GB/GB]; 56 Malvern Gardens, Hedge End, Southampton, Hampshire SO30 2UL (GB).

(74) Agents: DEARLING, Bruce et al.; Motorola, European Intellectual Property Operations, Midpoint, Alencon Link, Basingstoke, Hampshire RG21 7PL (GB).

(81) Designated States: AL, AM, AT, AU, AZ, BA, BB, BG, BR, BY, CA, CH, CN, CU, CZ, DE, DK, EE, ES, FI, GB, GE, HU, IL, IS, JP, KE, KG, KP, KR, KZ, LC, LK, LR, LS, LT, LU, LV, MD, MG, MK, MN, MW, MX, NO, NZ, PL, PT, RO, RU, SD, SE, SG, SI, SK, TJ, TM, TR, TT, UA, UG, US, UZ, VN, ARIPO patent (GH, KE, LS, MW, SD, SZ, UG), Eurasian patent (AM, AZ, BY, KG, KZ, MD, RU, TJ, TM), European patent (AT, BE, CH, DE, DK, ES, FI, FR, GB, GR, IE, IT, LU, MC, NL, PT, SE), OAPI patent (BF, BJ, CF, CG, CI, CM, GA, GN, ML, MR, NE, SN, TD, TG).

Published
Without international search report and to be republished upon receipt of that report.

(54) Title: A MULTIMEDIA CONFERENCING SYSTEM FOR USE DURING CELLULAR NETWORK HANDOVER AND METHOD OF USING SAME



(57) Abstract

A multimedia conferencing terminal (300) for use in a cellular multimedia network utilizing a plurality of multimedia modes of transmission includes a transceiver (315) for transmitting and receiving a multimedia communications signal. A control channel processor (327) is used for providing status information concerning both currently used cells and candidate cells available for use in a cell handover. A media requirement and priority processor (329) supplies requirement information about each media currently in use during a multimedia call. A selection processor (325) is used for selecting a multimedia cell for handover and scheduling the hadover of the individual modes based on the status information and the mode requirement information such that only one or more modes may be handed over and the selection processor may store and forward selective multimedia communications modes to other cells at a later time.

FOR THE PURPOSES OF INFORMATION ONLY

Codes used to identify States party to the PCT on the front pages of pamphlets publishing international applications under the PCT.

AL	Albania	ES	Spain	LS	Lesotho	SI	Slovenia
AM	Armenia	FI	Finland	LT	Lithuania	SK	Slovakia
AT	Austria	FR	France	LU	Luxembourg	SN	Senegal
AU	Australia	GA	Gabon	LV	Latvia	SZ	Swaziland
AZ	Azerbaijan	GB	United Kingdom	MC	Monaco	TD	Chad
BA	Bosnia and Herzegovina	GE	Georgia	MD	Republic of Moldova	TG	Togo
BB	Barbados	GH	Ghana	MG	Madagascar	TJ	Tajikistan
BE	Belgium	GN	Guinea	MK	The former Yugoslav Republic of Macedonia	TM	Turkmenistan
BF	Burkina Faso	GR	Greece			TR	Turkey
BG	Bulgaria	HU	Hungary	ML	Mali	TT	Trinidad and Tobago
BJ	Benin	IE	Ireland	MN	Mongolia	UA	Ukraine
BR	Brazil	IL	Israel	MR	Mauritania	UG	Uganda
BY	Belarus	IS	Iceland	MW	Malawi	US	United States of America
CA	Canada	IT	Italy	MX	Mexico	UZ	Uzbekistan
CF	Central African Republic	JP	Japan	NE	Niger	VN	Viet Nam
CG	Congo	KE	Kenya	NL	Netherlands	YU	Yugoslavia
CH	Switzerland	KG	Kyrgyzstan	NO	Norway	ZW	Zimbabwe
CI	Côte d'Ivoire	KP	Democratic People's Republic of Korea	NZ	New Zealand		
CM	Cameroon			PL	Poland		
CN	China	KR	Republic of Korea	PT	Portugal		
CU	Cuba	KZ	Kazakstan	RO	Romania		
CZ	Czech Republic	LC	Saint Lucia	RU	Russian Federation		
DE	Germany	LI	Liechtenstein	SD	Sudan		
DK	Denmark	LK	Sri Lanka	SE	Sweden		
EE	Estonia	LR	Liberia	SG	Singapore		

A MULTIMEDIA CONFERENCING SYSTEM FOR USE DURING CELLULAR NETWORK HANDOVER AND METHOD OF USING SAME

Field of the Invention

This invention relates in general to multimode communication and more particularly to control of cell handover in a cellular multimedia conferencing network.

Background of the Invention

Technological advancement has created an ever increasing need for rapid and reliable communication for personal use as well as for business and industry. Most often, these communications are only required between two persons or stations however there are many situations in which a conference group must be established between three or more persons in multiple locations.

During conferencing, a communications network is specifically adapted to accommodate multiple conferencing stations at any number of remote locations. These stations can then be simultaneously addressed with all information shared between each station throughout the conference group. Thus, once a conference call is formed, interparty communications are exchanged openly with all information distributed equally between all stations in the conference group.

Additionally, there are often situations in which differing modes of communication i.e. different media, other than voice are required. As one may note during a typical telephone conversation, a person's voice alone often cannot adequately convey all necessary information to a one or more conferees in the call. During these times, persons must often rely on other forms of media such a facsimile or electronic mail to receive text and image information. Obviously, this can create any number of problems since the text and data cannot be simultaneously presented with the voice. Consequently, the substance and character of the presenter's information

are not properly conveyed to the conferees with a speaking voice alone, and the information's true meaning or content can be lost.

This most recently has led to multimedia type conferencing communications using integrated service digital networks (ISDN) where voice and video can be presented at the same time. Moreover, there is envisioned a Universal Mobile Telecommunications System (UMTS) which is planned to support mobile multimedia services. One scenario which UMTS is expected to support is the Multimedia Conference Call. This is a call which enables a number of people to hold a meeting without needing to be physically present in the same location. Multimedia facilities in support of such a conference include the delivery of voice, video, text, still images and other forms of data.

A problem often occurs during a multimedia conference between two or more stations, when a station's movement is required, within the multimedia cellular network, while a multimedia conference call is in progress. Unlike standard GSM cellular telephone network traffic, a number of modes such as audio, video or textual information may be simultaneously in use during the multimedia conference call. Therefore, for a full and proper handover to occur, the cell to which the communications media is to be handed over must have the capability of handling the appropriate conferencing modes as well as the bandwidth requirements for providing communication for these modes. When the target cell does not have the capability or bandwidth for providing all these conferencing modes, several modes must be dropped or temporarily discontinued during the conference before handover to an adjacent cell is completed. Furthermore, since some media will have a higher priority over others, the selection of target cell will be influenced by the capability or resources of the candidate cell.

Still yet other problems can occur since media have different activity characteristics, delay constraints and quality constraints and may require handover at different times.

Thus, the need exists to provide an apparatus and method which will select the best cell for multimedia cell handover as well as scheduling handover of multiple media during a conferencing call.

Summary of the Invention

A multimedia conferencing terminal for use with a cellular multimedia network utilizing a plurality of multimedia modes of transmission comprising: a transceiver for transmitting and receiving a multimedia communications signal; an adjacent cell measurement controller for measuring signals on at least one candidate cell to use for a handover and for supplying measurement information therefrom; a control channel processor used for exchanging identity and resource information of the at least one candidate cell with the cellular multimedia network; a service requirements memory for supplying mode requirement information about the plurality of multimedia modes of transmission currently in use during a multimedia call; and a selection processor for selecting a multimedia cell for handover based on the measurement information and the mode requirement information.

Brief Description of the Drawings

FIG. 1 is a block diagram showing the configuration of a typical cellular network system.

FIG. 2 is a block diagram illustrating the components in a cellular telephone handset.

FIG. 3 is a block diagram illustrating a typical multimedia conferencing communication among a plurality of stations.

FIG. 4 is a pictorial representation illustrating the display of voice, video, text and graphical information at a multimedia terminal.

FIG. 5 is a block diagram of a typical multimedia terminal in accordance with the preferred embodiment of the invention.

FIG. 6 is a block diagram of a cell selection processor used in the multimedia communications terminal and the multimedia network controller.

FIG. 7 is a block diagram of the system architecture of a multimedia conferencing system which can communicate in a multimedia cellular network.

Detailed Description of the Preferred Embodiment

Turning now to FIG. 1, a wireless communication network 10 is shown and preferably includes a mobile switching center 12, and a plurality of cell sites 14 having base site controllers 16. Finally, mobile communication devices 18 or portable communications devices 17 (collectively "mobile units") are adapted to communicate with base stations associated with base site controllers 16 to maintain communications with another mobile unit or a wireless unit associated with a landline network.

In FIG. 2, a block diagram 20 shows a mobile unit according to the present invention. In the preferred embodiment, an ASIC (Application Specific Integrated Circuit) 21, such as a CMOS ASIC available from Motorola, Inc. and microprocessor 23, such as a 68HC11 microprocessor also available from Motorola, Inc., combine to generate the necessary communication protocol for operating in a cellular system.

The microprocessor 23 uses RAM 25, EEPROM 27, and ROM 29, consolidated in one package 31 in the preferred embodiment, to execute the steps necessary to generate the protocol and to perform other functions for the communication unit, such as writing text, image or video to a display 33, accepting information from a keypad 35, and controlling a frequency synthesizer 45. The microprocessor 23 further processes audio transformed by the audio circuitry 39 from a microphone 37 and to a speaker 41. Transmitter 43 transmits through an antenna 49 using carrier frequencies produced by the frequency synthesizer 45.

Information received by the communication unit's antenna 49 enters the receiver 47 which demodulates the symbols comprising the message frame using the carrier frequencies from the frequency synthesizer 45. The wireless communication device may optionally include a message receiver and storage device 40 that may include a digital signal processor. The message receiver and storage device could be, for example, a digital answering machine or a paging receiver. While the circuitry of FIG. 2 shows an exemplary wireless communication device, other circuitry could be employed within the scope of the present invention.

Referring to FIG. 3, there is shown a multipoint multimedia conferencing network 100 according to the preferred embodiment of the invention having three stations or communications terminals 110, 120, and

150. The communications terminals 110, 120, and 150 are shown as wireless communications devices that may be used with or include two way radio equipment or cellular telephones. It should be recognized by those skilled in the art, that although shown in a wireless environment, the multipoint multimedia conferencing environment can also be used in a fixed or permanently attached network with physical interconnection.

Each of the communications terminals include an audio, video and/or data terminal 170 that is either integrated with or connect to the communications terminal for transmitting and receiving any number of multimedia services. These multimedia services includes audio, video, textual, graphical or data information that can be presented to the user in any number of formats. Thus, in order to fully convey messages and information, it is often necessary to have the capability to use a number of different media to adequately convey a message to one or more recipients. For example, a person may wish to give a presentation to a number of conferees who are not physically present with the person wishing to convey multipoint information. In this case, a conferencing type call may be initiated. Conferees who are members of the communication would be required to have the appropriate multimedia equipment in order to receive the appropriate forms of media information transmitted by the person initiating the information.

In use, each of the communications terminals 110, 120 and 150 transmit and receive multimedia information using a multimedia conferencing network 190. The multimedia conferencing network 190 provides a central location or node for processing and control of the various forms of multimedia information. The multimedia conferencing network 190 works to coordinate the transfer of multimedia conferencing information so that each of the terminals 110, 120 and 150 may communicate and interact no matter which types of media are transmitted through the network. Additionally, the multimedia conferencing network can be interconnected in a trunked or cellular arrangement to permit the communications terminals to be used over a wide geographic range - even further increasing the system's versatility.

FIG. 4 shows a pictorial representation illustrating the display of voice, video, text and graphical information at a video/data terminal 170. In this example, User-1's screen is segmented and displays real time video

pictures of User-2 201, User-3 203, User-4 205 and User-5 207. Each video block represents a person or station that is a participant in the multipoint multimedia conference call. Additionally, textual information 209 and graphical information 211 can be shown in separate video segments. During the multimedia conference call, the textual information 209 and the graphical information 211 help to aid User-1, who is viewing the other participants in the multimedia conference call, in understanding the true content of any information or data that may be discussed audibly or presented visually during the conference.

With reference to FIG. 5, an integrated multimedia terminal 300 is shown for use with three services or media. Although three media are shown, it will be evident to those skilled in the art, that the multimedia terminal 300 can include any number of media capabilities. During a multimedia communication, information is input or output to/from media 1 301, media 2 303 and media 3 305 respectively where it is processed using a respective media signal processor (307, 309, 311). Each processor acts to both convert the respective media information to or from the proper digital protocol where it can be multiplexed and demultiplexed bidirectionally using a MUX/DMUX 313. The data stream is then used by a transceiver 315 for transmission and reception to a multimedia network having appropriate multimedia infrastructure.

Each of the respective media processors (307, 309, 311) provide quality measurement signals that are supplied to a MUX/DMUX 319. The quality measurement signals are multiplexed and demultiplexed into a digital information stream 323 with synchronization and activity information 321 that is provided by each media (301,303,305). The digital data stream is supplied to a cell selection processor 325. The cell selection processor 325 uses the digital data stream 323 in addition to a control channel processor 327, an adjacent cell measurement controller 331, and a media requirements and priority processor 329 to determine and indicate to the multimedia cellular infrastructure of the media requirements for cell handover. The control channel processor 327, media requirements and priority processor 329 and adjacent cell measurement controller 331 are described hereinafter.

The control channel processor 327 operates on the transmit and receive control channels of the current cell and is used for communication

exchange between the cell selection processor 325 and the cellular network infrastructure. The information obtained from the cellular network infrastructure includes identity of candidate cells and capability and resource information concerning candidate cells. The other information exchanged depends upon whether handover decisions are made in the terminal 300 or in the cellular network infrastructure.

The media requirements and priority processor 329 informs the cell selection processor 325 of the service transmission requirements for the different multimedia modes. These will include such data as bandwidth requirements, delay constraints and maximum bit error rate. Further, the media requirement and priority processor 329 will act to inform of the relative priority between the different media used active in the call. The adjacent cell measurement controller 331 supplies the cell selection processor with received data concerning adjacent cell measurements and signal strength. The identity of cells to be measured is determined by the cell selection processor 325. This allows the cell selection processor 325 to suggest a candidate cell for cell handover during a multimedia communication.

A handover decision is made by either the cell selection processor 325 or the cellular network infrastructure or both. When a decision has been taken, the cell selection processor 325 informs the radio controller 333 of the frequencies and schedule for the handover of the various media. This includes information on any media that are temporarily or permanently suspended, or on any previously suspended media which are reactivated within the new cell and to which store and forward data is sent. The radio controller 333 then acts to electronically control the operation of the radio components and software within the multimedia terminal 300 to execute the cell handover.

Thus, during a multimedia communication or call, the link quality, mode capability and resource availability of the current and candidate cells is established. The link availability and quality estimates for each media component are derived from the signal link measurements of candidate cells. As can be recognized by those skilled in the art, except for the transceiver 315, all the elements shown in FIG. 5 may be implemented in the package 31 and message receiver and storage device 40 of FIG. 2.

In FIG. 6, details of the cell selection processor 325 are shown that include a quality processor 401. For each candidate cell, the quality processor 401 matches the highest priority media to the available resources, examines the quality of the supported media, and thereby generates an overall quality measure 413 of the candidate cell.

Thus, to the quality processor 401 are provided quality measurements for each media for the multimedia cell currently in use 403, the estimated quality of each media on candidate cell obtained from the quality mapping processor 411, and the resource availability of the candidate cell 419. The relative priority of the media is obtained 407 and is also used in 401. An overall candidate cell quality measure 415 is also generated for the current cell.

The quality mapping processor 411 reviews the media requirement and priority information 407 and estimates a quality measure for each media from the candidate cell measurements 405. The quality measure will be different for each media because each media has it's own transmission characteristics such as coding and interleaving, in addition to it's own performance requirements in terms of delay, bit error rate etc.

The overall candidate cell quality measure 415 for each candiate cell is used to compile a list of prioritized candidate multimedia cells. This is accomplished using a prioritization comparator 417 which generates the prioritized list, selects the preferred cell and generates a preferred candidate cell quality measure 421 for the preferred candidate cell. This information is then sent to a triggering control 423. The triggering control 423 utilizes information from the current quality measure 413 and the preferred candidate cell quality measure 421 to indicate to a schedule controller 427 to which multimedia cell, that one or more media should be handed over.

The scheduling controller 427 uses the data from the triggering control 423, resource availability information 419 and activity status multimedia mode information 425 to calculate and determine the appropriate time that one or more media used in a multimedia communication will be handed over to one or more candidate cells. The scheduling controller 427 also determines those media which are temporarily or permanently suspended, or if any previously suspended media are reactivated within the new cell. Subsequently, the scheduling controller 427 will convey this information via a handover output port 430.

As seen in FIG. 7, the multimedia cellular infrastructure 500 includes two multimedia cells , Cell A and Cell B, connected to a mobile switching network. Each cell includes a transmitter/receiver which communicates with a plurality of multimedia stations communicating using the cell. These communications are put into a serial digital format, using a multiplexer/demultiplexer 503. Before the information within a call is switched using a switching network 509, the various types of media information, are converted to a common protocol using a multimedia signal processor 505. The multimedia signal processor also provides quality information 525. As noted in Cell B, there will be a respective multimedia signal processor 511, 513 for each media that is used in that multimedia cell.

In FIG. 7, the multimedia signal processors 505, 511 and 513 are associated with a particular terminal 540. One media 505 is provided to the terminal 540 through Cell A and two media are provided through Cell B. A control channel 533 is shown between the infrastructure and the terminal 540 is in this case provided through Cell B.

After switching, the activity status 535 of the processed media 515, 517, 519 is presented to the cell selection processor 523. Each terminal 540 may have its own set of media, signal processing and cell selection processors. The cell selection processor 523 uses this information along with quality information 525, control information 527 and information from the media and requirements processor 529 to make a determination as to the specific media that can be handed over to another multimedia cell during the handover processing.

As indicated above, quality information is defined as data pertaining to both present multimedia communication quality and prospective multimedia communications quality for handover to one or more candidate multimedia cells. The control information is transmitted and received by the cell selection processor 523 and includes measurement reports of candidate cells from the multimedia terminal and signaling information indicating to the multimedia terminal 300, information on the handover schedule for the different media.

Information from the media requirements and priorities processor 529 is stored data which is used by the cell selection processor 523 to determine the transmission requirements of a specific media, such as audio, video, textual or graphical information for media handover. These will include

such data as bandwidth requirements, delay constraints and maximum bit error rate. Further, the media requirement and priority processor 529 will act to inform of the relative priority between the different media used active in the call. Additionally, a radio resource management processor 531 supplies information concerning the service capability and resource available in a candidate cell.

For example, a candidate cell may not have enough bandwidth and resources available to accommodate a media that would require a high bandwidth. Thus, if both audio and video were required to be handed over to a candidate cell, it may not be possible to handover the video portion of the multimedia communication due to the video's high bandwidth requirements. The candidate cell may have inadequate resources due to a high number of users or communications on the cell, a large amount of cell resources in use or a combination of these. Although preferably all multimedia cells would have capability to accommodate all communication media, at times the multimedia resources will be at high capacity and handover of all media may not be possible. In addition, some cells may not be capable of offering some media at all. For example, some cells may not be able to deliver high bit rate services because they have not been upgraded from an older less capable technology.

In the event that full media services are not able to be passed or handed over to a candidate cell, portions of a multimedia communication may be stored and forward to the candidate cell at a later time. This often will depend on the media in use. For example, if a multimedia communication were to include voice, video and data transmission, there may be situations were not all of these various media would be capable of being handed over to a candidate cell. The cell selection processor 325, 523 can be programmed using the media requirements and priorities processor 529 to prioritize that media that will be first dropped during these circumstances. Thus, the cell selection processor 325, 523 can be selected to selectively drop low priority media in a call. Low priority media may be any data media such as the textual portions of a call. This information can be easily stored at the multimedia cell that is currently in use and later forward to candidate cell during at some other time when the candidate cell resources become available.

To reiterate, both the cell selection processor 325, 523:

1) decides which adjacent multimedia cells should be monitored based upon availability information provided from the radio resource management system. If functionally of the cell handover totally resides in the multimedia terminal 300, rather than the multimedia cellular infrastructure, information will be passed on the control channel 533;

2) maps quality estimates on candidate cells to quality of each media component;

3) ranks candidate cell for handover based on information obtained from the media requirement and priority processor 529 as well as information from a radio resource management processor 531;

4) triggers handover to a preferred candidate cell with the radio resource management processor 531;

5) schedules handover for each media component based on status and/or synchronization information such as voice activity, framing, packet data activity or the like, and the availability of resources obtained from the radio resource management processor 531;

6) informs the switching network 509 of the handover schedule for each media component; and

7) informs the network switching function if any media component is terminated or in a standby mode.

Hence during handover, a multimedia terminal enters a mode of operation allowing access to multiple cells in accordance with the handover schedule. The network updates the routing of the media components according to the handover schedule generated by the cell selection processors 323, 525. In the event that a media is not capable of being transferred at handover, it can be stored and forward to a candidate cell at a later time or when handed off to a new candidate cell.

Claims

1. A multimedia communications system for providing handover between a first base station and at least one candidate base station, comprising a terminal for communicating multimedia information including at least one of a plurality of multimedia modes, wherein a selector is provided for identifying a preferred candidate base station from the at least one candidate base station for handover from the first base station based on data relating to the ability of the candidate base station to support the at least one of a plurality of multimedia modes.

2. A system as claimed in Claim 1, further comprising a control channel processor for providing the data.

3. A system as claimed in Claim 1, further comprising a radio resource manager for providing the data.

4. A system as claimed in Claim 1, further comprising a memory for providing the data.

5. A system as claimed in Claim 1, wherein the data includes media requirement information relating to the at least one of the plurality of multimedia modes.

6. A system as claimed in Claim 1, wherein the data includes information relating to relative priority between the at least one of the plurality of multimedia modes and the plurality of multimedia modes.

7. A system as claimed in Claim 1, wherein the data includes measurement data between the terminal and the system relating to the candidate base station.

8. A system as claimed in Claim 1, wherein the data includes capability or resource availability information between the terminal and the system relating to the preferred candidate base station.

9. A system as claimed in Claim 8, further comprising a radio resource manager for supplying capability or resource availability information between the terminal and the system relating to the preferred candidate base station.

10. A system as claimed in Claim 1, wherein the selector is further arranged to schedule the at least one of the plurality of multimedia modes for handover.

11. A system as claimed in Claim 1, wherein the selector is further arranged to store and forward selective multimedia communications that have not been handed over to the preferred candidate base station.

12. A multimedia terminal for a cellular multimedia network having a first base station and at least one candidate base station, the terminal comprising a transceiver for transmitting and receiving at least one of a plurality of multimedia modes, wherein a selector is provided for identifying a preferred candidate base station for handover from the first base station based on data relating to the ability of the preferred candidate base station to support the at least one of the plurality of multimedia modes.

13. A terminal as claimed in Claim 12, wherein the data relating to the ability of the preferred candidate base station to support the at least one of the plurality of multimedia modes is a measured signal relating to the at least one candidate base station.

14. A terminal as claimed in Claim 12, further comprising a measurement controller for providing the measurement signal data.

15. A terminal as claimed in Claim 12, wherein the data relating to the ability of the preferred candidate base station to support the at least one of the plurality of multimedia modes is resource information relating to the at least one candidate base station.

16. A terminal as claimed in Claim 12, further comprising a channel controller for providing the resource information data and for exchanging identity information between the terminal and the network.

17. A terminal as claimed in Claim 12, wherein the data relating to the ability of the preferred candidate base station to support the at least one of the plurality of multimedia modes is information relating to the at least one of the plurality of multimedia modes in use during a multimedia call.

18. A terminal as claimed in Claim 17, further comprising a memory for providing the requirement information data.

19. A terminal as claimed in Claim 12, wherein the at least one of the plurality of multimedia modes includes audio, video, textual or graphical information.

20. A terminal as claimed in Claim 12, wherein the selector is arranged to select the handover of the at least one of the plurality of multimedia modes to the preferred candidate base station.

21. A terminal as claimed in Claim 12, wherein the selector is arranged to store multimedia data constituting a transmission of the at least one of the plurality of multimedia modes and subsequently forwarded the multimedia data at a later time.

22. A method for providing handover between a first base station and at least one of a plurality of candidate base stations in a network comprising the steps of:

determining at least one of a plurality of multimedia communication modes currently used in a multimedia communication;

determining whether to handover between the first base station and the at least one of the plurality of candidate base stations based on data relating to the ability of the candidate base station to support the at least one of the plurality of multimedia modes.

23. A method as claimed in Claim 22, wherein the step of determining whether handover is possible includes determining the availability of the at least one candidate base station for handover.

24. A method as claimed in Claim 22, wherein the step of determining whether handover is possible includes determining the quality of a candidate multimedia communication mode available from the at least one candidate base station.

25. A method as claimed in Claim 22, wherein the step of determining whether handover is possible includes determining the capabilities or resource bandwidth of the at least one candidate base station.

26. A method as claimed in Claim 22, wherein the step of determining whether handover is possible includes comparing the multimedia communication modes currently in use, the quality of a candidate multimedia communication mode available from the at least one candidate base station, the capabilities and resource bandwidth available of the at least one candidate base station and the priority of the at least one of the plurality of multimedia communication modes to determine a current quality measurement and an overall candidate base station quality measurement.

27. A method as claimed in Claim 26, further comprising the step of identifying the at least one of the base stations for handover by comparing the overall quality measurement of the at least one candidate base station to determine a prioritised list of candidate base stations indicating a best alternative quality measurement.

28. A method as claimed in Claim 22, wherein the step of determining whether to handover includes comparing a current quality measurement with a best alternative quality measurement to provide a triggering decision indicating an optimum candidate base station for handover from the plurality of candidate base stations.

29. A method as claimed in Claim 28, further comprising the step of determining handover scheduling by comparing the triggering decision, the

resource availability in the at least one of the plurality of candidate base stations and an activity status of the at least one of the plurality of multimedia modes to determine handover scheduling information of the at least one of the plurality of multimedia modes during the multimedia communication to the optimum candidate base station.

30. A multimedia communications system used for interfacing cellular networks and providing cell handover for at least one of a plurality of multimedia stations and at least one multimedia mode of a plurality of multimedia modes used during a multimedia communication system comprising:

a plurality of stations for communicating multimedia information;

a interface network connected to at least one multimedia cell comprising:

a switching network for switching communications information between a plurality of cellular communications systems;

a control channel processor used for exchanging identity, measurement data, and capability and resource availability information concerning the at least one candidate cell between the at least one of the plurality of multimedia station and the multimedia communications system;

a service requirements and priorities memory for supplying media requirement information about the media currently in use during a multimedia call and for supplying information on the relative priority between media;

a radio resource management processor for supplying information concerning the service capability and resource availability of the at least one candidate cell; and

a selection processor for selecting a multimedia cell for handover based on the measurement data, the candidate cell capability and resource availability information, and the media requirement information.

31. A multimedia conferencing terminal for use with a cellular multimedia network utilising a plurality of multimedia modes of transmission comprising:

a transceiver for transmitting and receiving a multimedia communications signal;

an adjacent cell measurement controller for measuring signals on at least one candidate cell to use for a handover and for supplying measurement information therefrom;

a control channel processor used for exchanging identity and resource information of the at least one candidate cell with the cellular multimedia network;

a service requirements memory for supplying mode requirement information about the plurality of multimedia modes of transmission currently in use during a multimedia call; and

a selection processor for selecting a multimedia cell for handover based on the measurement information and the mode requirement information.

32. A method for selecting a multimedia cell during handover in a multimedia conferencing network comprising the steps of:

determining the multimedia communication modes currently used in a multimedia communication;

determining the availability of at least one candidate cell for multimedia cell handover;

determining the quality of the multimedia communication modes available within the at least one candidate cell;

determining the capabilities and resource bandwidth available of the at least one candidate cell;

comparing the multimedia communication modes currently in use, the quality of the multimedia communication modes available within the at least one candidate cell, the capabilities and resource bandwidth available of the at least one candidate cell and the priority of the multimedia communication modes to determine a current quality measurement and an overall candidate cell quality measurement;

comparing the overall quality measurement of the at least one candidate cell to determine a prioritised list of candidate cells indicating a best alternative quality measurement;

comparing the current quality measurement with the best alternative quality measurement to provide a triggering decision indicating the optimum candidate cell for handover; and

comparing the triggering decision, the resource availability in the at least one candidate cell and an activity status of the at least one media to determine handover scheduling information of at least one multimedia mode during the multimedia communication to the optimum candidate cell.

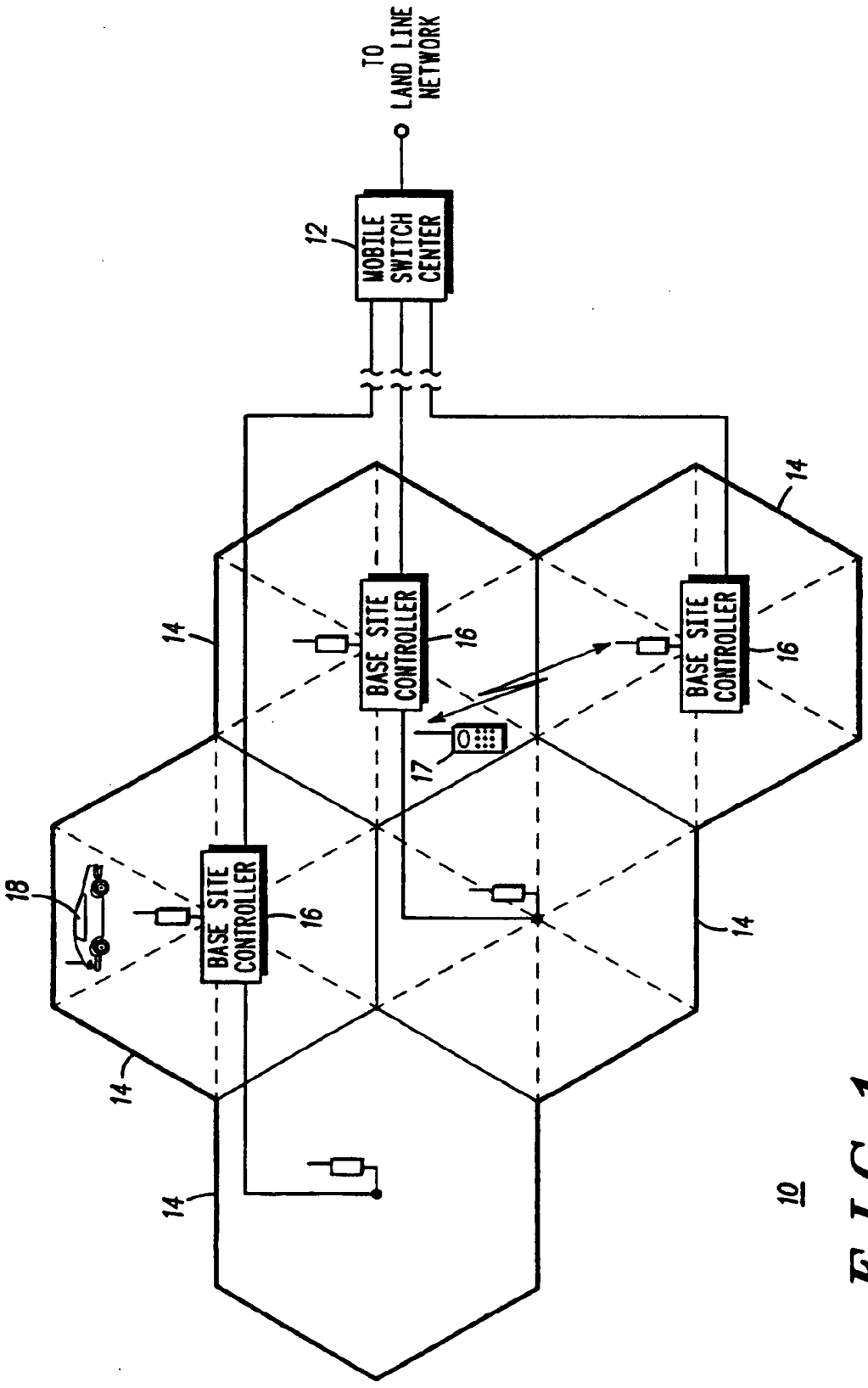

TO LAND LINE NETWORK
12
MOBILE SWITCH CENTER
14
BASE SITE CONTROLLER
16
17
18
10

FIG.1

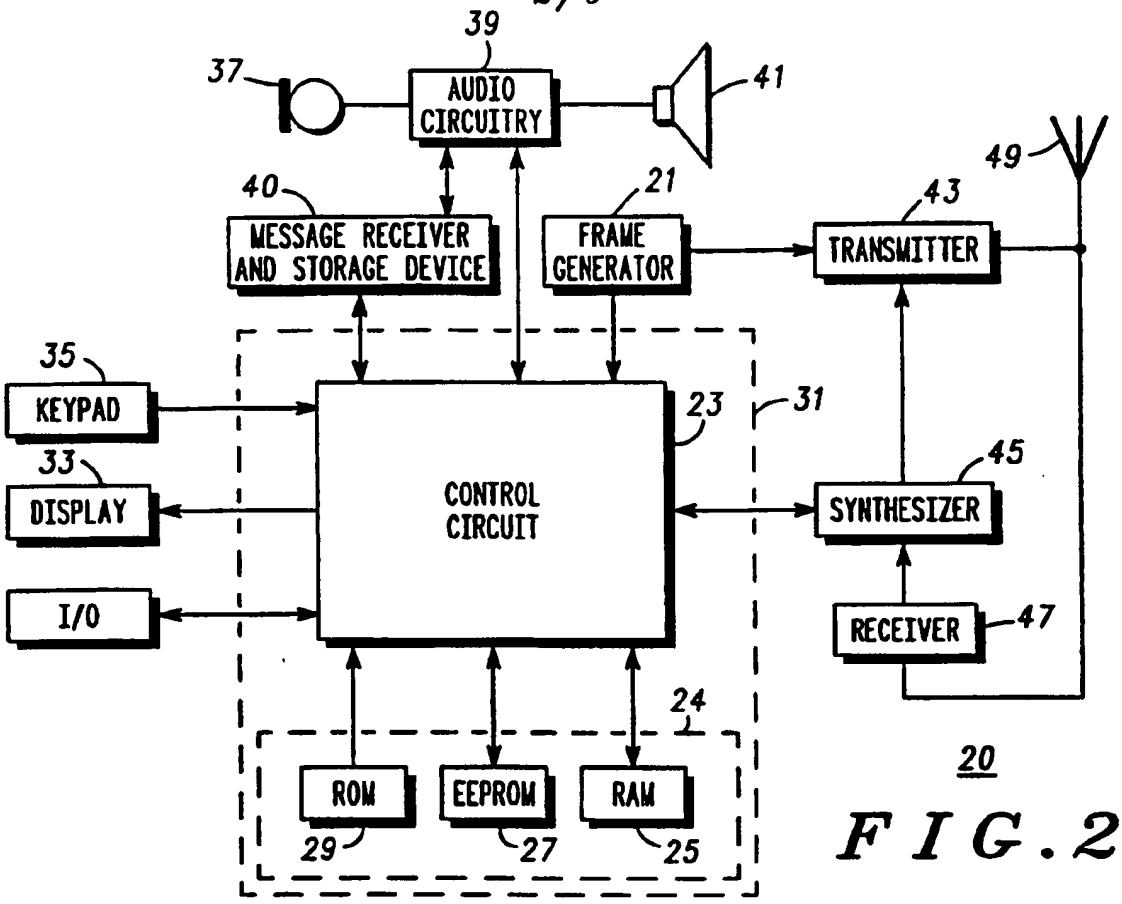

39
37
AUDIO CIRCUITRY
41
49
40
MESSAGE RECEIVER AND STORAGE DEVICE
21
FRAME GENERATOR
43
TRANSMITTER
35
KEYPAD
23
31
33
DISPLAY
CONTROL CIRCUIT
45
SYNTHESIZER
I/O
RECEIVER
47
24
ROM
EEPROM
RAM
29
27
25
20

FIG. 2

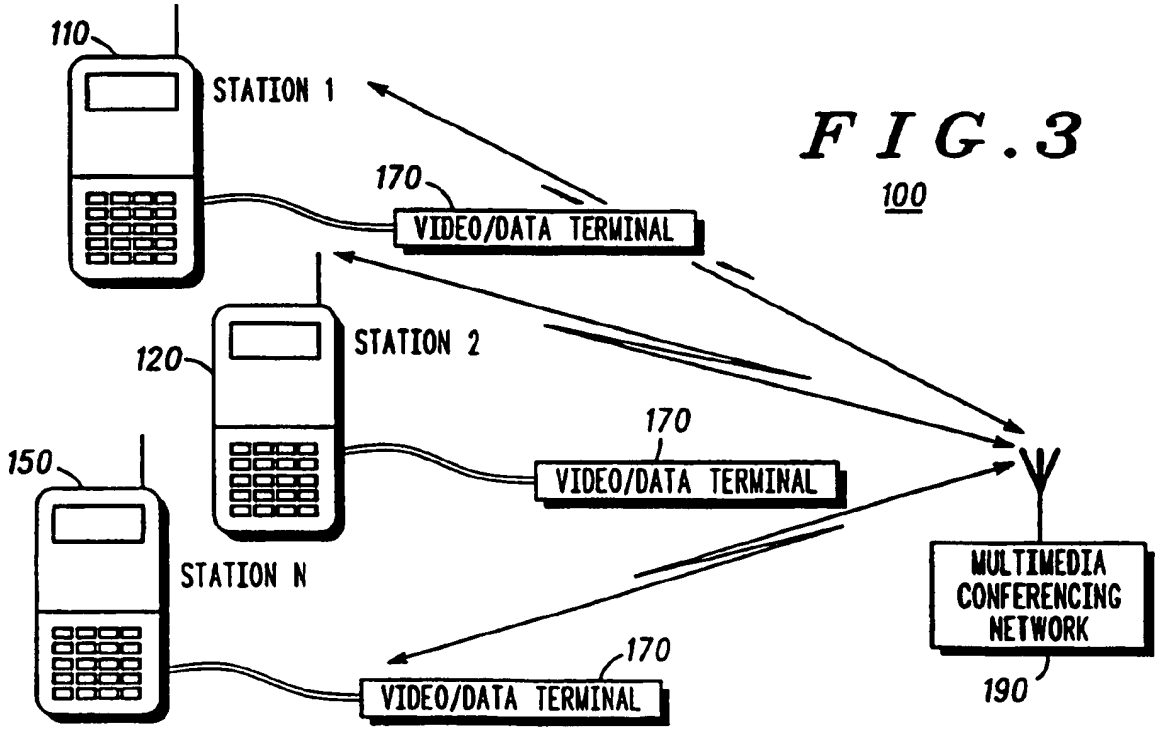

110
STATION 1
170
VIDEO/DATA TERMINAL
120
STATION 2
170
VIDEO/DATA TERMINAL
150
STATION N
170
VIDEO/DATA TERMINAL
MULTIMEDIA CONFERENCING NETWORK
190
100

FIG. 3

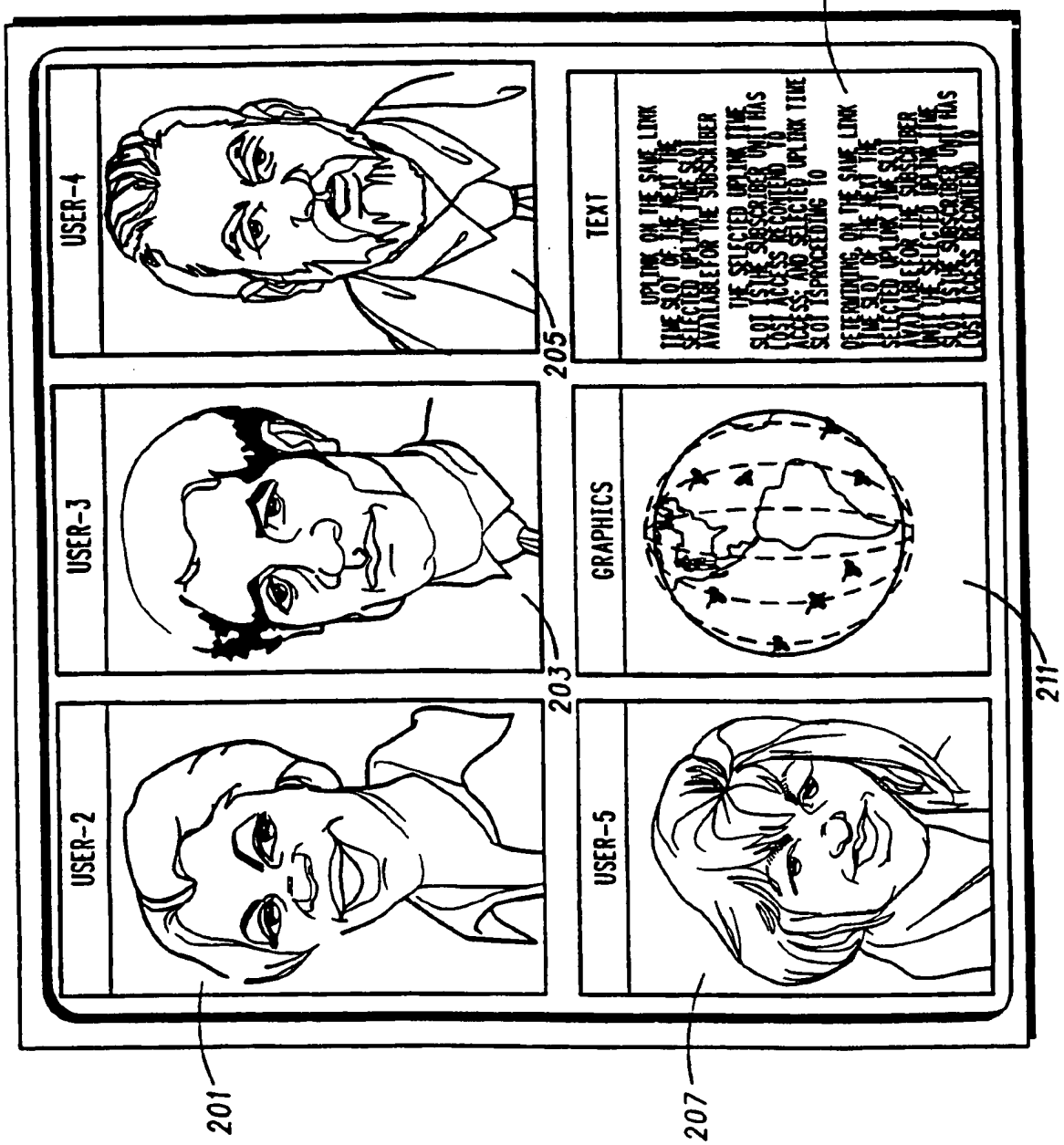

USER-2
USER-3
USER-4
GRAPHICS
TEXT
USER-5
201
203
205
207
209
211

FIG. 4

200

FIG.5

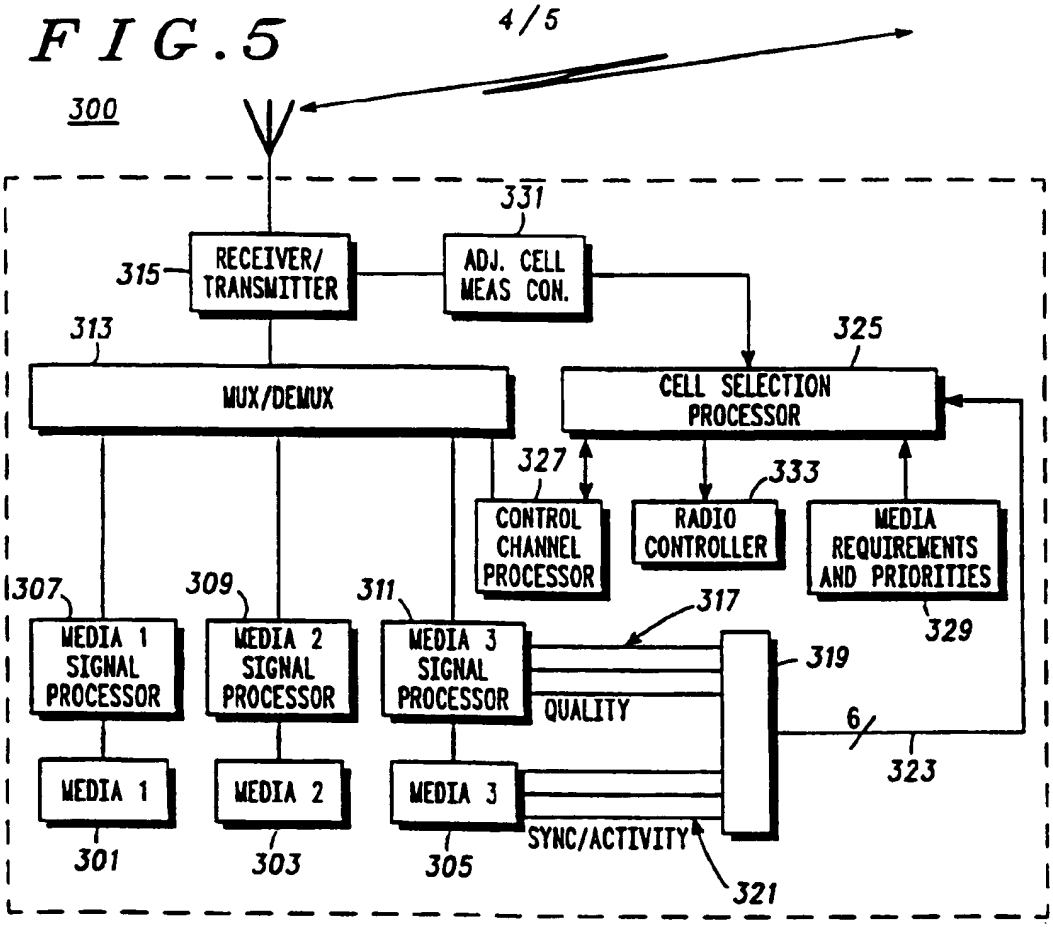
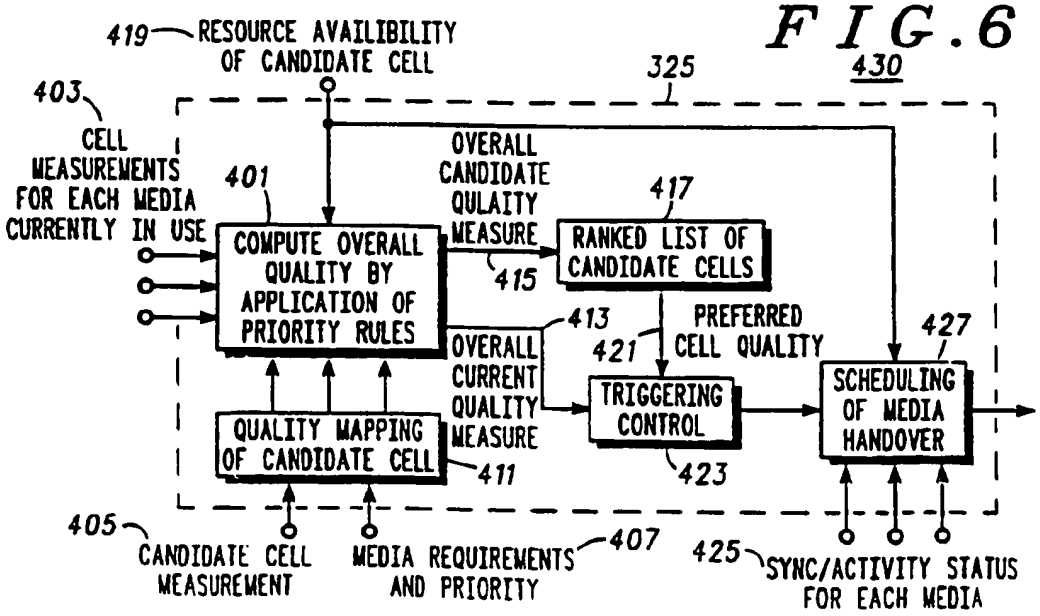

300
331
315
RECEIVER/ TRANSMITTER
ADJ. CELL MEAS CON.
313
325
MUX/DEMUX
CELL SELECTION PROCESSOR
327
333
CONTROL CHANNEL PROCESSOR
RADIO CONTROLLER
MEDIA REQUIREMENTS AND PRIORITIES
329
307
309
311
317
MEDIA 1 SIGNAL PROCESSOR
MEDIA 2 SIGNAL PROCESSOR
MEDIA 3 SIGNAL PROCESSOR
319
QUALITY
6
323
MEDIA 1
MEDIA 2
MEDIA 3
SYNC/ACTIVITY
301
303
305
321

FIG.6


419
RESOURCE AVAILIBILITY OF CANDIDATE CELL
430
325
403
CELL MEASUREMENTS FOR EACH MEDIA CURRENTLY IN USE
401
OVERALL CANDIDATE QULAITY MEASURE
417
COMPUTE OVERALL QUALITY BY APPLICATION OF PRIORITY RULES
RANKED LIST OF CANDIDATE CELLS
415
413
421
PREFERRED CELL QUALITY
427
OVERALL CURRENT QUALITY MEASURE
TRIGGERING CONTROL
SCHEDULING OF MEDIA HANDOVER
QUALITY MAPPING OF CANDIDATE CELL
411
423
405
CANDIDATE CELL MEASUREMENT
MEDIA REQUIREMENTS AND PRIORITY
407
425
SYNC/ACTIVITY STATUS FOR EACH MEDIA

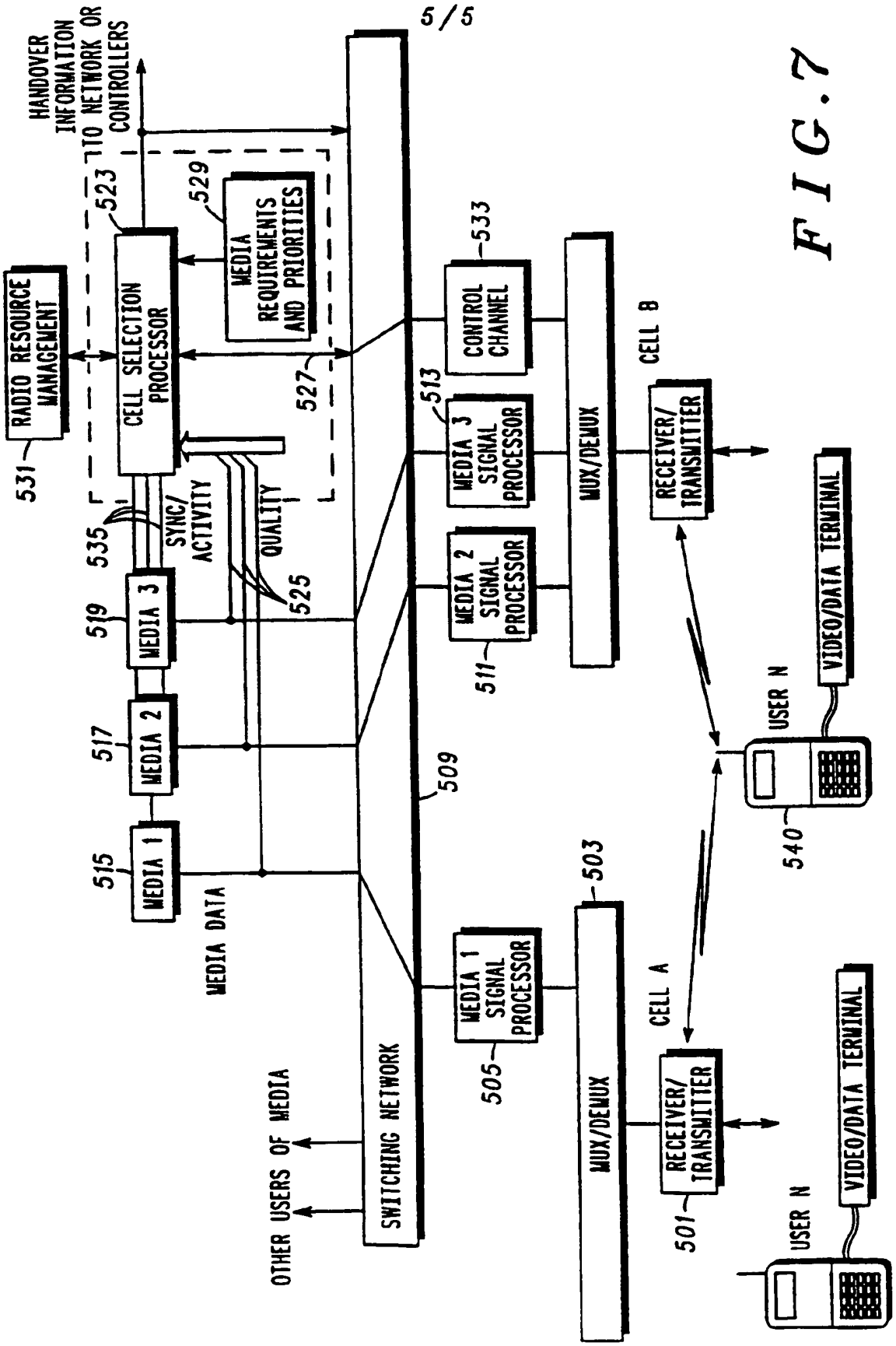

HANDOVER INFORMATION TO NETWORK OR CONTROLLERS
523
529
MEDIA REQUIREMENTS AND PRIORITIES
RADIO RESOURCE MANAGEMENT
CELL SELECTION PROCESSOR
531
527
533
CONTROL CHANNEL
513
MEDIA 3 SIGNAL PROCESSOR
MUX/DEMUX
CELL B
RECEIVER/ TRANSMITTER
535
SYNC/ ACTIVITY
QUALITY
525
519
MEDIA 3
MEDIA 2 SIGNAL PROCESSOR
511
517
MEDIA 2
VIDEO/DATA TERMINAL
USER N
515
MEDIA 1
509
MEDIA DATA
540
503
MEDIA 1 SIGNAL PROCESSOR
CELL A
OTHER USERS OF MEDIA
SWITCHING NETWORK
505
MUX/DEMUX
RECEIVER/ TRANSMITTER
501
USER N
VIDEO/DATA TERMINAL

FIG. 7